

phase shift mask (independent claim 45), a method of using a phase shift mask (independent claim 60), and a semiconductor device formed using a phase shift mask (independent claim 61). A common element in all the claims is a phase shifter film formed by a long throw sputtering process.

In making his rejection under §103, the Examiner pointed out that Mitsui teaches manufacturing a phase shift film, and that both Hu and Chiang teach forming a film using a long-throw sputtering process. The Examiner then concluded that it would have been obvious to combine the teachings of Mitsui with the teachings of Hu or Chiang to yield the claimed invention because the advantages of using a long throw sputtering technique for making layers on substrate similar to those in the mask art were well known at the time of the invention.

Applicants disagree. The Examiner has failed to make out a *prima facie* case of obviousness, because he has not provided an objective teaching in the art that would have motivated a skilled artisan to combine the references as contended in the Office Action to yield the claimed invention. The Examiner simply states that it was “well known” to make layers similar to the claimed layer by long throw sputtering, but does not provide any support for this statement, either within or without the cited references. Without some show of support, the Examiner’s statement is simply speculative, and cannot support an obviousness rejection.

Moreover, the claimed invention would not have been obvious in view of the cited references because the inventive process step (i.e., the step of forming a phase shifter film using a reactive long throw sputtering process) yields unexpected results which are not taught or suggested by the references of the prior art. Specifically, the claimed phase shift mask and process results in high transmittance in certain exposure light wavelengths. Moreover, the present invention results in a low-defect mask, due to making the inventive film using a long

throw sputtering process. This process reduces the density of active and inert gases, so that metal grains sputtered from the sputtering target reach the substrate directly, thereby resulting in a high-density film of high refraction. See, page 32, lines 8-17 of the present application.

Furthermore, since the sputtering distance is large, the effects of reactive gases reaching the sputtering target are smaller, reducing oxidation and nitriding of the target, thereby reducing factors that cause defects, such as particles or pinholes, in the mask. Still further, in the inventive manufacturing process, the amount of reactive gases reaching the sputtering target is reduced, even when the gases are supplied in large volumes. Therefore, sufficient oxidation and nitriding occur on the substrate to result in a film having a high transmittance. See, page 32, lines 18-25 of the present application.

Thus, it would not have been obvious to combine Mitsui with Hu or Chiang to yield the claimed invention.

Consequently, independent claims 1, 15, 27, 38, 45, 60 and 61 are patentable, as are claims 2, 3, 5-7, 16, 17, 19-26, 28-37, 39, 40, 42-44, 46, 47, 49-59, 62, and 66-74, which depend from claims 1, 15, 27, 38, 45, and 61, respectively.

Reconsideration and withdrawal of the rejection of claims 1-3, 5-7, 15-17, 19-40, 42-47, 49-62 and 66-74 under §103 is respectfully requested.

Claims 4, 18, 41, and 48, which were indicated to contain allowable subject matter, are also patentable, because their base claims 1, 15, 38 and 45 are patentable.

Applicants have made every effort to present claims which distinguish over the prior art, and it is believed that all claims are in condition for allowance. However, Applicants invite the Examiner to call the undersigned if it is believed that a telephonic interview would expedite the prosecution of the application to an allowance. Accordingly, and in view of the foregoing


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remarks, Applicants hereby respectfully request reconsideration and prompt allowance of the pending claims.

To the extent necessary, a petition for an extension of time under 37 C.F.R. § 1.136 is hereby made. Please charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, to Deposit Account 500417, and please credit any excess fees to such deposit account.

Respectfully submitted,

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